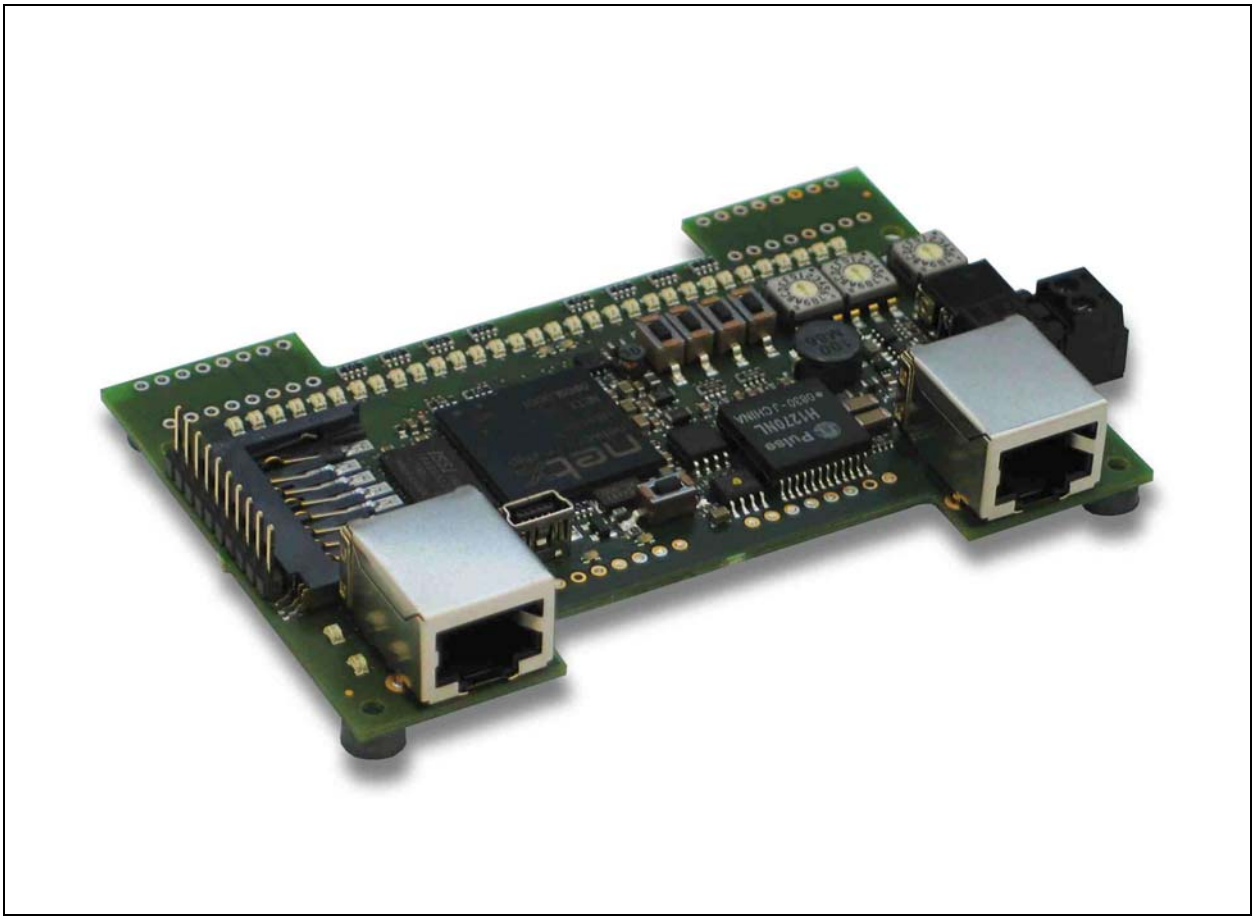
User Manual

NXIO 50-RE-Board

Hardware Description



Hilscher Gesellschaft für Systemautomation mbH

www.hilscher.com

DOC090101UM06EN | Revision 6 | English | 2012-11 | Released | Public

Table of Contents

1 INTRODUCTION 4
1.1 About the User Manual 4
1.1.1 Obligation to read and understand the Manual 4
1.1.2 List of Revisions 4
1.1.3 Conventions in this Manual 5
1.2 Reference to Hardware and Firmware 6
1.3 Contents of the Product CD 6
1.4 Legal Notes 7
1.4.1 Copyright 7
1.4.2 Important Notes 7
1.4.3 Exclusion of Liability 8
1.4.4 Warranty 8
1.4.5 Export Regulations 9
2 SAFETY 10
2.1 General Note 10
2.2 Intended Use 10
2.3 Personnel Qualification 10
2.4 Safety Instructions to avoid Property Damage 10
2.4.1 Device Destruction by exceeding allowed Supply Voltage 10
2.4.2 Electrostatically sensitive Devices 11
2.5 Labeling of Safety Messages 11
2.5.1 References Safety 11
3 DESCRIPTION AND REQUIREMENTS 12
3.1 Description 12
3.1.1 netX50 Technology 13
3.2 Supply Voltage 14
3.3 Requirements 14
4 DEVICE DRAWINGS AND CONNECTIONS 15
4.1 Power Supply 19
4.2 Types of the NXIO 50-RE Boards 20
4.2.1 NXIO 50-RE 20
4.2.2 NXIO 50-RE\CL 20
4.2.3 NXIO 50-RE\CR 21
4.2.4 NXIO 50-RE\CN 21
4.2.5 NXIO 50-RE\CA 22
4.3 Property Damage Messages 22
4.3.1 Device Destruction by exceeding allowed Supply Voltage 22
4.3.2 Electrostatically sensitive Devices 22
4.4 Possibilities of sticking NXIO 50 Boards togehter 23

© Hilscher, 2009-2012

4.4.1 Allowed Interconnections 23
4.4.2 Forbidden Interconnections 24

5 CONFIGURATION 25
5.1 PROFINET IO Device 25
5.1.1 General Data 25
5.1.2 Configuring NXIO 50-RE for PROFINET IO 26
5.2 EtherCAT Slave 27
5.2.1 General Data 27
5.2.2 Configuring NXIO 50-RE for EtherCAT Slave 27
5.3 EtherNet/IP Adapter (Slave) 28
5.3.1 General Data 28
5.3.2 Configuring NXIO 50-RE for EtherNet/IP Adapter (Slave) 28
5.4 SERCOS Slave 29
5.4.1 General Data 29
5.4.2 Configuring NXIO 50-RE for sercos 29
5.5 Open Modbus/TCP Server 30
5.5.1 General Data 30
5.5.2 Configuring NXIO 50-RE for Open Modbus/TCP Server 30
5.6 POWERLINK Controlled Node (Slave) 31
5.6.1 General Data 31
5.6.2 Configuring NXIO 50-RE for POWERLINK Controlled Node (Slave) 31

6 INTERFACES 32
6.1 Ethernet Interface 32
6.1.1 Ethernet pinning at the RJ45 Socket 32
6.1.2 Ethernet Connection Data 32
6.1.3 Use of Hubs and Switches 33
6.2 Mini-B USB- Connector (5- Pin) 33

7 LEDS REAL-TIME-ETHERNET- SYSTEMS 34
7.1 LED Names of the Real-Time Ethernet Systems 34
7.2 SYS-LED 35
7.3 LEDs Real-Time Ethernet Protocols 36
7.3.1 LED EtherCAT-Slave 36
7.3.2 LED EtherNet/IP-Adapter (Slave) 38
7.3.3 LED Open Modbus/TCP 39
7.3.4 LED POWERLINK Controlled Node / Slave 40
7.3.5 LED PROFINET IO-RT-Device 42
7.3.6 LED sercos Slave 43

8 TECHNICAL DATA 45

9 GLOSSARY 46

10 CONTACTS 47

© Hilscher, 2009-2012

1 Introduction

1.1 About the User Manual

This User Manual contains a description about the configuration of the NXIO 50-RE board and a description of the hardware.

1.1.1 Obligation to read and understand the Manual

Important!

- To avoid property damage to your device, you must read and understand all instructions in the manual and all accompanying texts to your device, before installing and operating your device.
- First read the **Safety Instructions** in the safety chapter.
- Obey to all **Safety Messages** in the manual.
- Keep the product DVD providing the product manuals.

1.1.2 List of Revisions

Index	Date	Chapter	Change
2	2009-03-12	all	created
3	2010-07-01	1.2	Firmware versions updated Device Desciption files updated
		4	20 and 21 meaning changed
4	2011-06-08	4	Note about connector 10 added
		7	Chapter *LEDs Real-Time-Ethernet- Systems* updated
5	2011-11-25	5.1.1	revised
		5.2.1	revised
		5.3.1	revised
		5.4.1	revised
		5.5.1	revised
		5.6.1	revised
6	2012-11-12	All	Power Supply updated to 18 …30 V DC
		1.2	Firmware versions updated
		2	Chapter *Safety* revised.
		4.3	Section *Property Damage Messages* added.
		5.1.1	Name of GSDML file updated
		5.6.1	Range for Node ID added.

Table 1: List of Revisions

© Hilscher, 2009-2012

1.1.3 Conventions in this Manual

Operation instructions, a result of an operation step or notes are marked as follows:

Operation Instructions:

➢ <instruction>

or

1. <instruction>
2. <instruction>

Results:

⇨ <result>

Notes:

Important: <important note>

Note: <note>

<note, where to find further information>

© Hilscher, 2009-2012

1.2 Reference to Hardware and Firmware

Hardware

Device	Part Number	Revision
NXIO 50-RE	2521.100	2
NXIO 50-RE\CL	2521.101	2
NXIO 50-RE\CR	2521.102	2
NXIO 50-RE\CN	2521.103	2
NXIO 50-RE\CA	2521.104	2

Table 2: Reference to Hardware

Firmware on MMC Card

Firmware	Protocol	Firmware Version
netx.rom	Bootloader	1.0.3993
netx01.rom	PROFINET IO Device	3.4.x.x
netx02.rom	EtherNet/IP Adapter	2.6.x.x
netx03.rom	EtherCAT Slave	2.5.x.x
netx04.rom	sercos Slave	3.1.x.x
netx05.rom	POWERLINK Controlled Node (Slave)	2.1.x.x
netx06.rom	Open Modbus Server	2.5.x.x

Table 3: Reference to Firmware

1.3 Contents of the Product CD

The product CD contains:

- Documentation: User Manual (this document)
- Schematic
- Device Description Files (GSDML, XML, EDS)
- Firmware

© Hilscher, 2009-2012

1.4 Legal Notes

1.4.1 Copyright

© Hilscher, 2009-2012, Hilscher Gesellschaft für Systemautomation mbH

All rights reserved.

The images, photographs and texts in the accompanying material (user manual, accompanying texts, documentation, etc.) are protected by German and international copyright law as well as international trade and protection provisions. You are not authorized to duplicate these in whole or in part using technical or mechanical methods (printing, photocopying or other methods), to manipulate or transfer using electronic systems without prior written consent. You are not permitted to make changes to copyright notices, markings, trademarks or ownership declarations. The included diagrams do not take the patent situation into account. The company names and product descriptions included in this document may be trademarks or brands of the respective owners and may be trademarked or patented. Any form of further use requires the explicit consent of the respective rights owner.

1.4.2 Important Notes

The user manual, accompanying texts and the documentation were created for the use of the products by qualified experts, however, errors cannot be ruled out. For this reason, no guarantee can be made and neither juristic responsibility for erroneous information nor any liability can be assumed. Descriptions, accompanying texts and documentation included in the user manual do not present a guarantee nor any information about proper use as stipulated in the contract or a warranted feature. It cannot be ruled out that the user manual, the accompanying texts and the documentation do not correspond exactly to the described features, standards or other data of the delivered product. No warranty or guarantee regarding the correctness or accuracy of the information is assumed.

We reserve the right to change our products and their specification as well as related user manuals, accompanying texts and documentation at all times and without advance notice, without obligation to report the change. Changes will be included in future manuals and do not constitute any obligations. There is no entitlement to revisions of delivered documents. The manual delivered with the product applies.

Hilscher Gesellschaft für Systemautomation mbH is not liable under any circumstances for direct, indirect, incidental or follow-on damage or loss of earnings resulting from the use of the information contained in this publication.

1.4.3 Exclusion of Liability

The software was produced and tested with utmost care by Hilscher Gesellschaft für Systemautomation mbH and is made available as is. No warranty can be assumed for the performance and flawlessness of the software for all usage conditions and cases and for the results produced when utilized by the user. Liability for any damages that may result from the use of the hardware or software or related documents, is limited to cases of intent or grossly negligent violation of significant contractual obligations. Indemnity claims for the violation of significant contractual obligations are limited to damages that are foreseeable and typical for this type of contract.

It is strictly prohibited to use the software in the following areas:

- for military purposes or in weapon systems;
- for the design, construction, maintenance or operation of nuclear facilities;
- in air traffic control systems, air traffic or air traffic communication systems;
- in life support systems;
- in systems in which failures in the software could lead to personal injury or injuries leading to death.

We inform you that the software was not developed for use in dangerous environments requiring fail-proof control mechanisms. Use of the software in such an environment occurs at your own risk. No liability is assumed for damages or losses due to unauthorized use.

1.4.4 Warranty

Although the hardware and software was developed with utmost care and tested intensively, Hilscher Gesellschaft für Systemautomation mbH does not guarantee its suitability for any purpose not confirmed in writing. It cannot be guaranteed that the hardware and software will meet your requirements, that the use of the software operates without interruption and that the software is free of errors. No guarantee is made regarding infringements, violations of patents, rights of ownership or the freedom from interference by third parties. No additional guarantees or assurances are made regarding marketability, freedom of defect of title, integration or usability for certain purposes unless they are required in accordance with the law and cannot be limited. Warranty claims are limited to the right to claim rectification.

© Hilscher, 2009-2012

1.4.5 Export Regulations

The delivered product (including the technical data) is subject to export or import laws as well as the associated regulations of different counters, in particular those of Germany and the USA. The software may not be exported to countries where this is prohibited by the United States Export Administration Act and its additional provisions. You are obligated to comply with the regulations at your personal responsibility. We wish to inform you that you may require permission from state authorities to export, re-export or import the product.

© Hilscher, 2009-2012

2 Safety

2.1 General Note

The user manual, the accompanying texts and the documentation are written for the use of the products by educated personnel. When using the products, all Safety Messages, Safety Messages, Property Damage Messages and all valid legal regulations have to be obeyed. Technical knowledge is presumed. The user has to assure that all legal regulations are obeyed.

2.2 Intended Use

The NXIO 50-RE Boards described in this manual are small modules for real-time Ethernet communication.

Note: The NXIO 50-RE is in no way optimized in terms of EMC compatibility. This product is intended to be used for evaluation and development purposes in lab environments only and is not suitable for production use!

2.3 Personnel Qualification

The NXIO devices must only be installed, configured, removed and used by qualified personnel.

2.4 Safety Instructions to avoid Property Damage

To avoid property damage respectively device destruction to the devices and to your system, you necessarily must read, understand and follow the following safety instructions and safety messages in this manual about danger causing property damage, before you install and operate your devices.

2.4.1 Device Destruction by exceeding allowed Supply Voltage

To avoid device destruction due to high supply voltage to your device, you must observe the following instructions. These instructions apply to all devices described in this manual.

The device may only be operated with the specified supply voltage. Make sure that the limits of the allowed range for the supply voltage are not exceeded. A supply voltage above the upper limit can cause severe damage to the device! A supply voltage below the lower limit can cause malfunction of the device. The allowed range for the supply voltage is defined by the tolerances specified in this manual.

The NXIO device may only be powered by a 24V DC ±6V supply voltage.

© Hilscher, 2009-2012

2.4.2 Electrostatically sensitive Devices

This equipment is sensitive to electrostatic discharge, which cause internal damage and affect normal operation. Therefore adhere to the necessary safety precautions for components that are vulnerable with electrostatic discharge, if you install or replace your device. Follow the guidelines listed hereafter when you handle this equipment:

- Touch a grounded object to discharge potential static.
- Wear an approved grounding wriststrap.
- Do not touch connectors or pins on the device.
- Do not touch circuit components inside the equipment.
- If available, use a static-safe workstation.
- When not in use, store the equipment in appropriate static-safe packaging.

Reference Safety [S3]

2.5 Labeling of Safety Messages

Safety Symbol	Sort of Warning or Principle
	Warning of Damages by Electrostatic Discharge

Table 4: Safety Symbols and Sort of Warning or Principle

Signal Word	Meaning	Meaning (USA)
NOTICE	Indicates a Property Damage Message.	Indicates a Property Damage Message.
Note	Indicates an important note in the manual.	Indicates an Important Note in the Manual.

Table 5: Signal Words

In this document all Safety Instructions and Safety Messages are designed according both to the international used safety conventions as well as to the ANSI Z535 standard, refer to reference safety [S1].

2.5.1 References Safety

[S1] ANSI Z535.6-2006 American National Standard for Product Safety Information in Product Manuals, Instructions, and Other Collateral Materials

[S2] IEC 60950-1, Information technology equipment - Safety - Part 1: General requirements, (IEC 60950-1:2005, modified); German Edition EN 60950-1:2006

[S3] EN 61340-5-1 and EN 61340-5-2 as well as IEC 61340-5-1 and IEC 61340-5-2

© Hilscher, 2009-2012

3 Description and Requirements

3.1 Description

The NXIO 50-RE boards described in this user manual are devices for Real-Time Ethernet communication. The board has two Ethernet sockets and is addressed by the same MAC address.

The netX 50 controller exchanges data between the connected Ethernet network and the LEDs respectively the push buttons of the board. The NXIO 50-RE board has a loader software (in the serial Flash) to start the firmware from the MMC card automatically. Furthermore the board has two RJ45 Ethernet sockets for Real-Time Ethernet communication.

A power supply with an output voltage in the range 18 to 30 V can be used.

Note: The NXIO 50-RE is in no way optimized in terms of EMC compatibility. This product is intended to be used for evaluation and development purposes in lab environments only and is not suitable for production use!

Depending on the firmware started from the MMC card the NXO 50-RE executes the on of the following Real-Time communication protocol:

- PROFINET IO-Device
- EtherCAT Slave
- EtherNet/IP Adapter (Slave)
- sercos Slave
- Ethernet POWERLINK Controlled Node (Slave)
- Open Modbus/TCP Server

The position of the rotary switch (25) of the board selects the firmware, which is loaded and started after power on respectively after pushing the reset button (1).

© Hilscher, 2009-2012

3.1.1 netX50 Technology

The netX50 is a member of Hilscher's family of highly integrated network controllers with a new system architecture optimized for communication and maximum data throughput.

Based on the 32-Bit CPU ARM 966E-S clocked with 200 MHz, it provides a total of 112 KB internal RAM (including 8 KB instruction TCM and 8 KB data TCM) and 64 KByte ROM. Memory can be expanded flexibly by use of the 32-Bit memory controller allowing the connection of external SDRAM, SRAM or FLASH.

Extensive peripheral functions, serial interfaces, such as UART, USB, SPI, I²C, as well as the integrated IO-Link and CCD controller allow a large scope of applications.

The central data switch and the free configurable communication channels with their own intelligence are the unique selling proposition of the netX as a "high end" network controller.

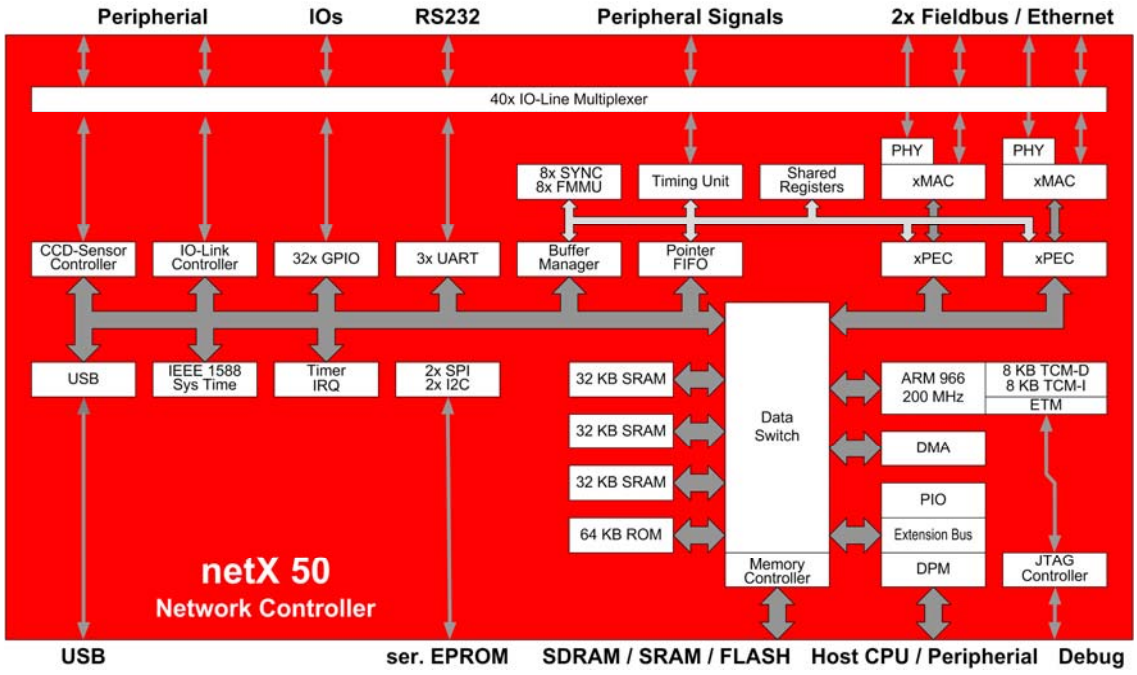


Figure 1: netX50 Block Diagram

The data switch provides five data paths, connecting the ARM CPU, the communication, Host and DMA controllers with the memory or the peripheral units. This allows all controllers to transmit their data in parallel, contrary to the traditional sequential architecture with only one common data bus and additional bus allocation cycles.

The identical set of controllers of the two communication channels are structured on two levels. They consist of dedicated ALUs and special logic units that receive their protocol functions via Microcode. For Ethernet the PHYs are integrated which means that the external circuit for Ethernet is reduced to passive componets: transformer and RC components.

The Medium-Access-Controller xMAC sends or receives the data according to the respective bus access process and encrypts or converts these into Byte depictions.

© Hilscher, 2009-2012

The Protocol Execution Controller xPEC compiles these into data packets and controls the telegram traffic. Large data amoutns are exchanged in DMA blocks over the memory of the ARM. In addition, every channel has a Dual-port-memory available for status information. Alternatively a triple buffer logic is implemented for a conflict free data exchange which always gives the address of the next free buffer.

With the intelligent communication ALUs, the netX carries out the most varied protocols and protocol combinations on one chip – an absolutely new feature in industrial communication technology.

3.2 Supply Voltage

The following table provides the required and permissible supply voltage of the NXIO devices.

Hardware	Supply Voltage
NXIO 50-RE\CA, NXIO 50-RE\CL, NXIO 50-RE\CR, NXIO 50-RE\CN	24V DC / 500mA / 2,6W +18 ... +30 V DC

Table 6: Supply Voltage Voltage NXIO Devices

3.3 Requirements

The following requirements have to be fulfilled for operation:

- DC power supply with 18 - 30 V (DC) output voltage, power consumption approximately. 2,6 W per Board.
- Communication Master
- Ethernet cable
- Firmware on plugged MMC card

© Hilscher, 2009-2012

4 Device Drawings and Connections

The following figure shows the position of the operating elements, interfaces and LEDs on the board.

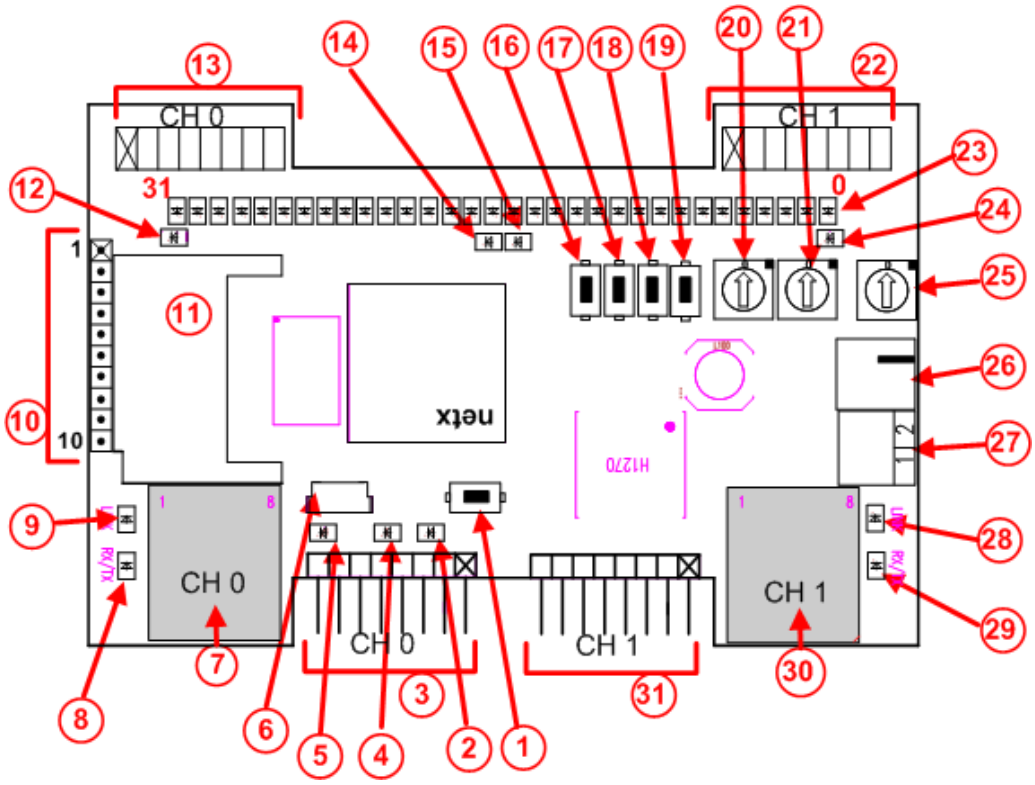


Figure 2: Layout of the NXIO 50-RE Board

Position Number	Type	Function
1	Pushbutton	Reset
2	LED	LED COM1 – communication status 1
3	Connector	Ethernet CH 0 and power supply
4	LED	LED COM0 – communication status 0
5	LED	LED SYS – system status
6	Mini-B USB Connector	Without function
7	RJ45 Socket	Ethernet CH 0
8	LED	Ethernet CH 0: Rx/Tx, ACT
9	LED	Ethernet CH 0: LINK
10	Connector strip	Trigger signals
11	MMD-Card Connector	To hold the MMC card with the protocol firmware.
12	LED	Input signal Bit 31, from pushbutton 16
13	Socket terminal strip	Ethernet CH 0 and power supply
14	LED	Input signal Bit 16, from push button 17

© Hilscher, 2009-2012

Position Number	Type	Function
15	LED	Input signal Bit 15, from push button 18
16	Pushbutton	Pushbutton input Bit 31
17	Pushbutton	Pushbutton input Bit 16
18	Pushbutton	Pushbutton input Bit 15
19	Pushbutton	Pushbutton input Bit 0
20	Rotary switch	Address switch (HIGH) *16, 0 … 15 (0 … F).
21	Rotary switch	Address switch (LOW), 0 … 15 (0 … F).
22	Socket terminal strip	Ethernet CH 1 and power supply
23	LED's	Output signals Bit 0 … 31
24	LED	Input signal Bit 15, from push button 19
25	Rotary switch	Firmware selection switch 1 netx01.rom – PROFINET IO 2 netx02.rom – EtherNet/IP 3 netx03.rom – EtherCAT 4 netx04.rom – sercos 5 netx05.rom – POWERLINK 6 netx06.rom – Open Modbus/TCP 7..F No protocol assigned
26	Socket	Power supply 24 V DC, ±6 V, max.0,5 A Outside = GND, Inside = +24 V For barrel connector: (ø5.5/ø2.1) L12 mm
27	Terminal	Power supply 24V DC, ±6 V Pin 1 = GND; Pin 2 = +24V
28	LED	Ethernet CH 1: LINK
29	LED	Ethernet CH 1: Rx/Tx, ACT
30	RJ 45 Socket	Ethernet CH 1
31	Socket terminal strip	Ethernet CH 1 and power supply

Table 7: Operator elements, interfaces and LEDs of the NXIO 50-RE Board

© Hilscher, 2009-2012

Pin assignment connector ③:

Pin	Signal	Meaning
1	GND	Ground
2		
3	+24 V	Power supply
4		
5	CH0 TX+	Ethernet Channel 0: transmit data +
6	CH0 TX–	Ethernet Channel 0: transmit data -
7	CH0 RX+	Ethernet Channel 0: receipt data +
8	CH0 RX–	Ethernet Channel 0: receipt data -

Table 8: Pin assignment of multi-pin connector 3

Pin assignment connector ⑩:

Pin	Signal	Meaning
1	GND	Ground
2		
3	PIO39	OUT (LED 0)
4	PIO85	IN 1
5	PIO84	IN 2
6	IOTRIG	Hardware Oszillator 25 Hz (20 ms High, 20 ms Low)
7	SAMLPE0	Not busy
8	SAMLPE1	Not busy
9	TRIG0	sercos: Con_Clk EtherCAT: Sync 0 Out
10	TRIG1	sercos: Nicht belegt EtherCAT: Sync 1 Out

Table 9: Signals of multi-pin connector 10

The connector pins 3 .. 6 have an in / output level of 3,3 V and a pullup-resistor of 50 KΩ. These are not short-circuit-proof!

The connector pins 7 .. 10 have an in / output level of 3,3 V and a pulldown-resistor of 50 KΩ. These are not short-circuit-proof!

Note: The pins of connector ⑩ are for oscilloscope measurements only.

© Hilscher, 2009-2012

Pin assignment connector 13:

Pin	Signal	Meaning
1	GND	Ground
2		
3	+24 V	Power supply
4		
5	CH0 TX–	Ethernet Channel 0: transmit data –
6	CH0 TX+	Ethernet Channel 0: transmit data +
7	CH0 RX–	Ethernet Channel 0: receipt data –
8	CH0 RX+	Ethernet Channel 0: receipt data +

Table 10: Signals of multi-pin connector 13

Pin assignment connector 22:

Pin	Signal	Meaning
1	CH1 TX–	Ethernet Channel 1: transmit data –
2	CH1 TX+	Ethernet Channel 1: transmit data +
3	CH1 RX–	Ethernet Channel 1: receipt data –
4	CH1 RX+	Ethernet Channel 1: receipt data +
5	+24 V	Power supply
6		
7	GND	Ground
8		

Table 11: Signals of multi-pin connector 22

Pin assignment connector 31:

Pin	Signal	Meaning
1	CH1 TX+	Ethernet Channel 1: transmit data +
2	CH1 TX–	Ethernet Channel 1: transmit data –
3	CH1 RX+	Ethernet Channel 1: receipt data +
4	CH1 RX–	Ethernet Channel 1: receipt data ten –
5	+24 V	Power supply
6		
7	GND	Ground
8		

Table 12: Signals of multi-pin connector 31

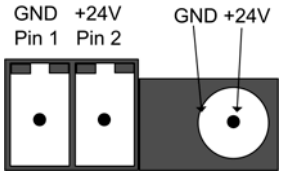
© Hilscher, 2009-2012

4.1 Power Supply

The NXIO 50-RE Board can be operated by a DC power supply from 18V to 30V. The connector for the power supply are on the right side: (26) and (27) . The power consumption per Board is 2,6 W.

The polarity of the power plug has to be considered. No alternating (AC) power supply can be used, because the board is not designed for this type of power supply. The current consumption depends on different factors, for example the operating mode of the netX, CPU load, usage of additional hardware and mainly from the level of the real input voltage (the higher the voltage the lower the current).

Pin	Description
1	Ground
2	18 - 30 V DC



The power connector is fitting for the power supply: **NXAC-Power**.

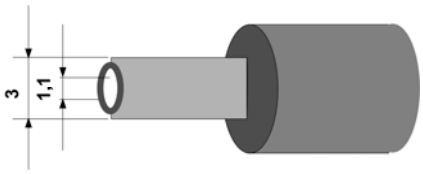
Technical Data of: **NXAC-Power** with **barrel connector**

Input: 100-240 V ~0,4 A (47-63 Hz)

Output: 24 V / 0,625 mA

cable length:1,8 m

Order number: 7930.000



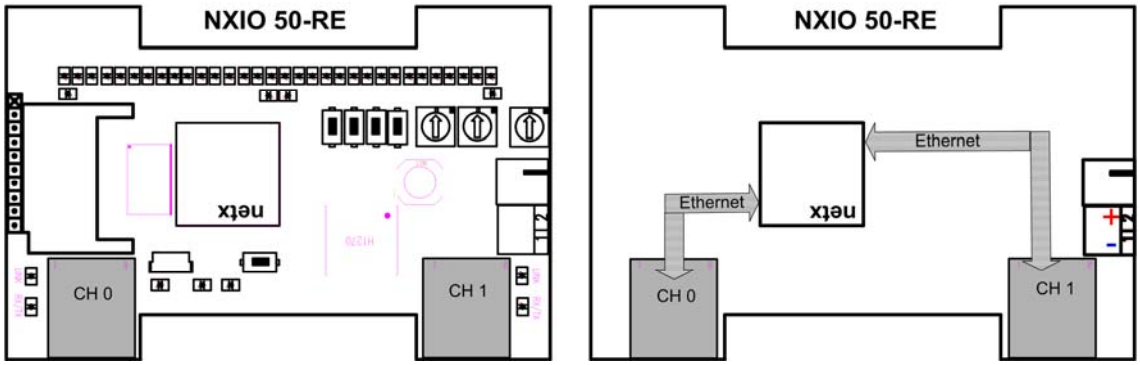
© Hilscher, 2009-2012

4.2 Types of the NXIO 50-RE Boards

The board is available in 4 different types and a connection board. In the following drawings the left drawing shows assembly view and the right drawing the signal flow/voltage feed.

4.2.1 NXIO 50-RE

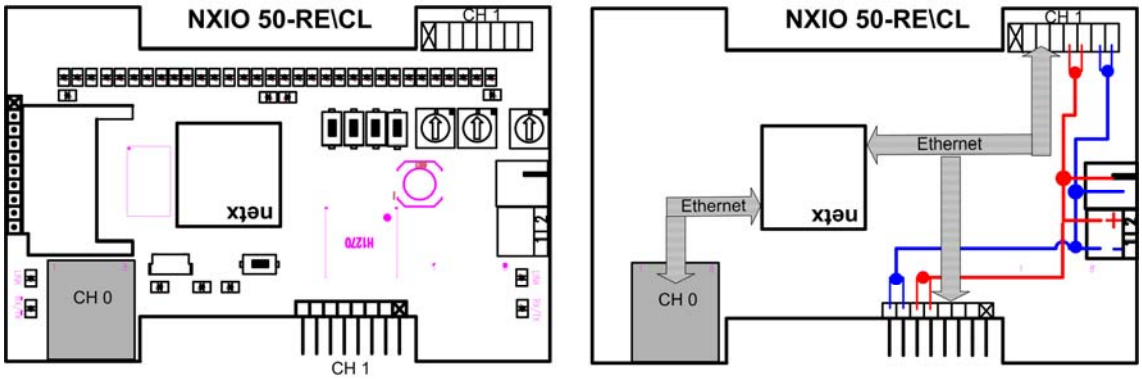
Order number: 2521.100



This board has 2 RJ45 Sockets to connect Ethernet cables. It can be used as an independent board.

4.2.2 NXIO 50-RE\CL

Order number: 2521.101

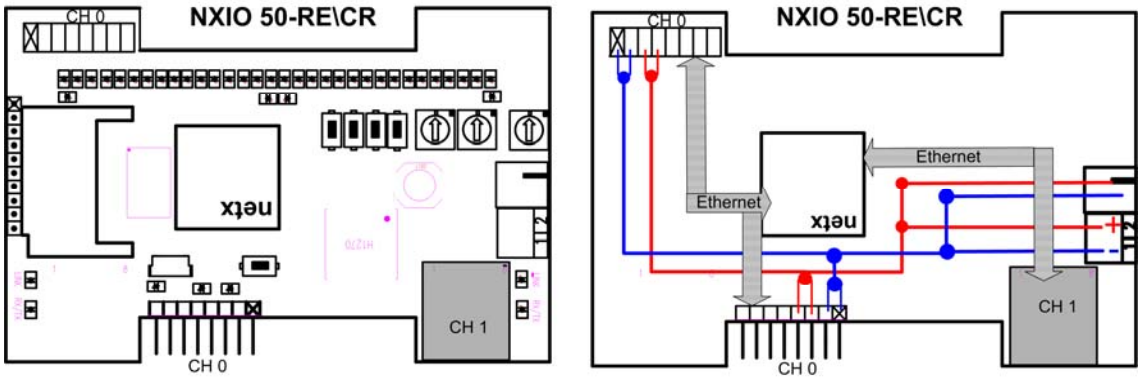


This board has 1 RJ45 socket on the left and is usable for a cable free connection (on the right) to additionally NXIO 50 boards. The second Ethernet connection is designed as multi-pin /multipoint connector. Via this multi-pin/multipoint connector other NXIO 50 board can be connected. The power supply is connected through.

© Hilscher, 2009-2012

4.2.3 NXIO 50-RE\CR

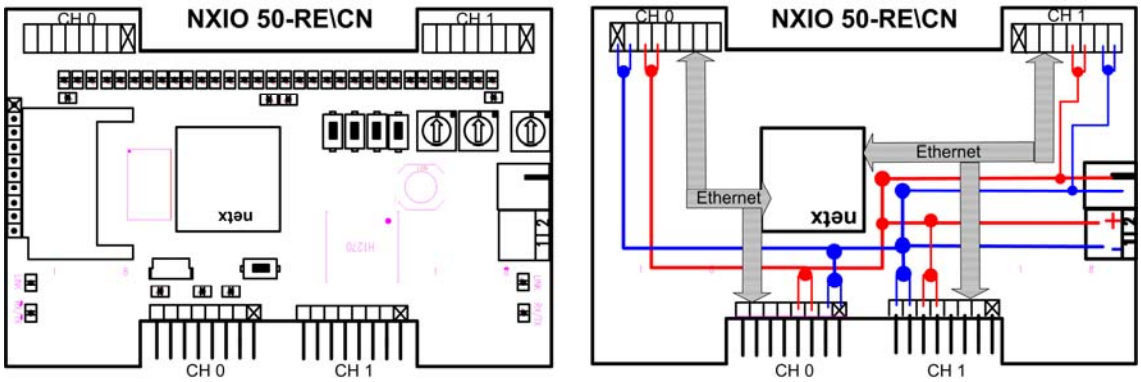
Order number: 2521.102



This board has 1 RJ45 socket on the right and is usable for a cable free connection (on the left) to additionally NXIO 50 boards. The second Ethernet connection is designed as multi-pin /multipoint connector. Via this multi-pin/multipoint connector other NXIO 50 board can be connected. The power supply is connected through.

4.2.4 NXIO 50-RE\CN

Order number: 2521.104

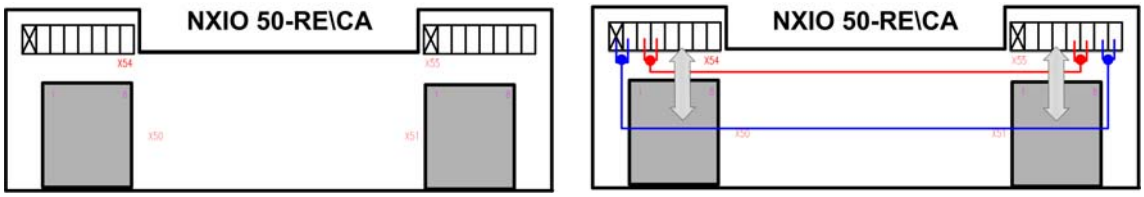


This board has no RJ45 socket and is usable for a cable free connection (on the left and the right) to additionally NXIO 50 boards. The Ethernet connections are designed as multi-pin /multipoint connectors. Via this multi-pin/multipoint connectors other NXIO 50 board can be connected. The power supply is connected through.

© Hilscher, 2009-2012

4.2.5 NXIO 50-RE\CA

Order number: 2521.103



This Ethernet connection board with RJ45 sockets is usable as adapter for the NXIO 50-RE\CN, NXIO 50-RE\CL and NXIO 50-RE\CR boards to make it possible to connect external devices via Ethernet sockets. Additionally a connection for power supply of the NXIO 50 boards sticked together is done.

4.3 Property Damage Messages

Obey to the following property damage messages, when installing your device.

4.3.1 Device Destruction by exceeding allowed Supply Voltage

NOTICE

Device Destruction!

- Use only the permissible supply voltage to operate the device.
- The device may only be powered by a 24V DC ±6V supply voltage.

4.3.2 Electrostatically sensitive Devices

Adhere to the necessary safety precautions for components that are vulnerable with electrostatic discharge.

NOTICE

Electrostatically sensitive Devices

- To prevent damage to the PC and the device, make sure that you are discharged when you touch the device.

© Hilscher, 2009-2012

4.4 Possibilities of sticking NXIO 50 Boards togehter

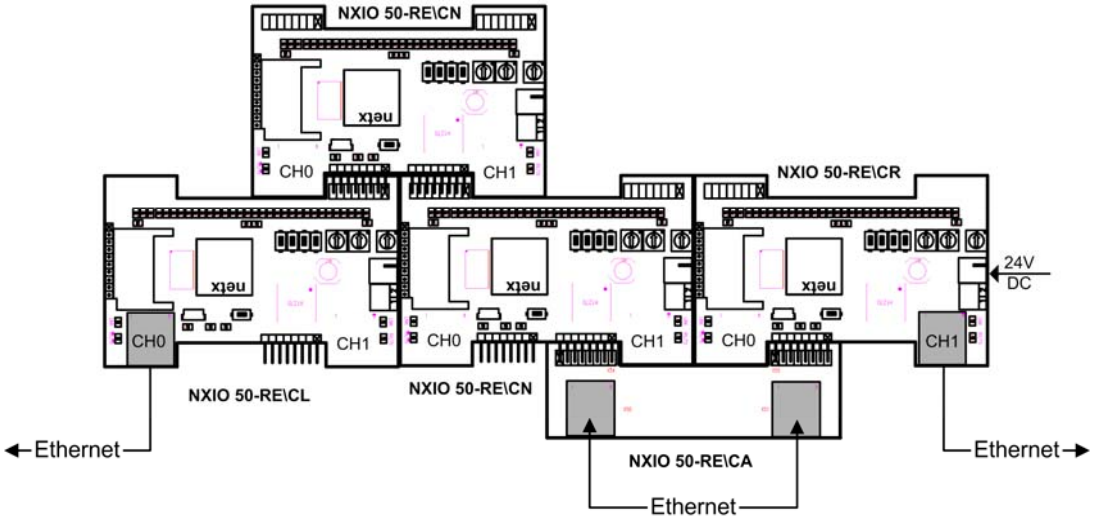
The advantage of these boards is that they can connected togheter without an Ethernet cable. The Ethernet frames that are not fort he NXIO board are going from Port 0 to 1 respectively from Port 1 to 0.

A maxium of 5 boards can be used with one power supply.

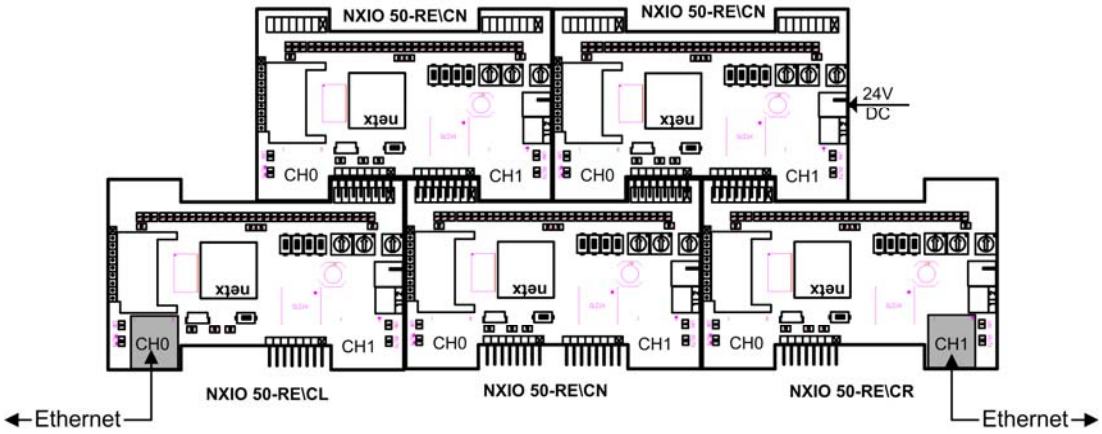
If more than 5 boards in an Ethernet network are used, then groups of maximum of 5 devices have to be installed. These groups have to be connected with an Ethernet cable. Each group needs it own power supply.

4.4.1 Allowed Interconnections

Basically the interconnection of boards is allowed in two lines.



The Ethernet connection on the NXIO 50-RE\CA adapter can be used to connect additionally devices and then is connected back to the NXIO 50-RE\CA adapter.

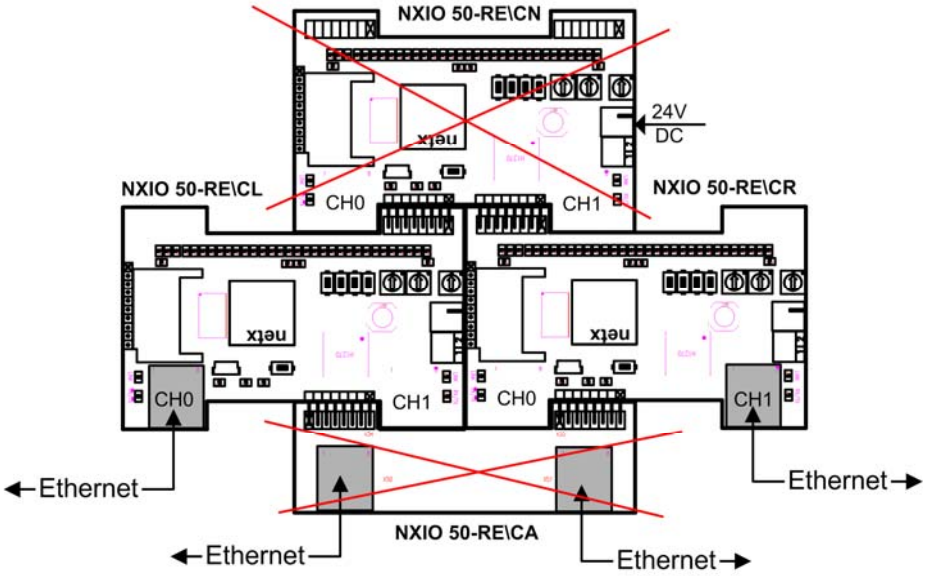


The maximum installation of NXIO boards regarding the power supply.

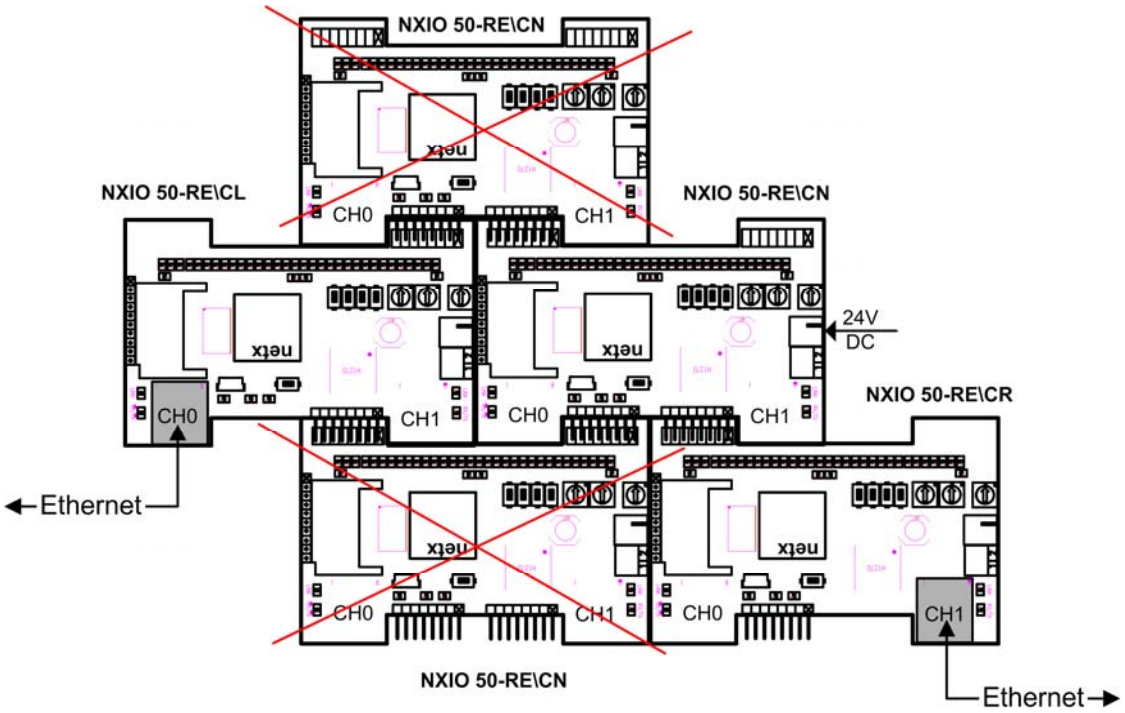
© Hilscher, 2009-2012

4.4.2 Forbidden Interconnections

Basically interconnections with more than one Ethernet connection on one port is forbidden.



In the interconnection above is either the red crossed NXIO 50-RE\CA ort he red crossed NXIO 50-RE\CN forbidden. Only one of these boards is allowed.



In the interconnection above is one of the red crossed NXIO 50-RE\CN boards forbidden.

© Hilscher, 2009-2012

5 Configuration

The protocol is selected with the rotary switch (25) of the board. This is only possible when in slot (11) of the board a SD/MMC card with firmware files on it is inserted in the slot.

5.1 PROFINET IO Device

5.1.1 General Data

<table>
<tr><th>Real-Time Ethernet System</th><th>PROFINET IO-Device</th></tr>
<tr><td>Protocol rotary switch (25)</td><td>Position 1</td></tr>
<tr><td>Address rotary switches (20) and (21)</td><td>Definition for the name of Station
<table>
<tr><th>Rotary switch (20)</th><th>Rotary switch (21)</th><th>name of station</th></tr>
<tr><td>0</td><td>1</td><td>nxio50repns-01</td></tr>
<tr><td>0</td><td>2</td><td>nxio50repns-02</td></tr>
<tr><td>0</td><td>3</td><td>nxio50repns-03</td></tr>
</table></td></tr>
<tr><td>GSDML (Device description file)</td><td>GSDML-V2.2-HILSCHER-NXIO 50 RE PNS-xxxxxxxx.xml (on CD)</td></tr>
<tr><td>System Requirements</td><td>PROFINET IO Controller</td></tr>
<tr><td>Support USB</td><td>Current Firmware has no USB Support</td></tr>
<tr><td>I/O Data</td><td>4 Byte Input, (Bit 0, 15, 16, 31 with push button switchable)
4 Byte Output (LED)</td></tr>
<tr><td>Communication</td><td>PROFINET IO RT
VLAN- and Priority-tagging</td></tr>
<tr><td>Functions</td><td>Cyclic Process Data
DCP
Context Management over CLRPC
Target/Actual Configuration Comparison</td></tr>
</table>

Table 13: General Data PROFINET IO Device

© Hilscher, 2009-2012

5.1.2 Configuring NXIO 50-RE for PROFINET IO

1. Verify that a SD/MMC card with the firmware files on it is inserted in slot (11) of the board.
2. The protocol switch (25) of the NXIO 50 board must be set to 1.
3. Set the name with which the board will later be identified with the address switch ((20) and (21)) on the NXIO 50 board.
4. Connect the power supply to the NXIO 50-RE Board.
5. Connect the boards/devices with Ethernet cables. Add switches if necessary. If you use only NXIO 50-RE boards for your installation then no switch is necessary.

Communication System	Hub	Switch
PROFINET IO	forbidden	applicable (100 MBit/s, Full duplex)

Table 14: Use of Hubs and Switches for PROFINET IO

6. Press the Reset push button (1) of the board that the firmware is loaded from the board.
7. If you like to change the default name of station for the NXIO 50 board then use the program Ethernet Device Configuration.

Note: For further information refer to the operation instruction manual **Ethernet Device Configuration** (Setting IP Address for Ethernet compatible Hilscher Devices using the DCP Protocol, ENDevCfg_en.pdf).

8. Configure the Master.

© Hilscher, 2009-2012

5.2 EtherCAT Slave

5.2.1 General Data

Real-Time Ethernet System	EtherCAT Slave
Protocol rotary switch (25)	Set protocol rotary switch to position 3
Address rotary switches	Not used
XML	Hilscher NXIO 50-RE ECS.xml (on CD)
System Requirements	EtherCAT Master
Support USB	Current firmware has no USB support
I/O Data	4 ByteInput (Bit 0, 15, 16 and 31 with push button switchable) 4 Byte Output (LED)
Acyclic Data	128 Bytes Mailbox Out 128 Bytes Mailbox In
Functions	Complex Slave COE (CANopen over Ethernet) Distributed Clock

Table 15: General Data EtherCAT Slave

5.2.2 Configuring NXIO 50-RE for EtherCAT Slave

1. Verify that a SD/MMC card with the firmware files on it is inserted in slot (11) of the board.
2. The protocol switch (25) of the NXIO 50 board must be set to 3.
3. Connect the power supply to the NXIO 50-RE Board.
4. Connect the boards/devices with Ethernet cables.

Communication System	Hub	Switch
EtherCAT	forbidden	applicable only between Master and 1. participant

Table 16: Use of Hubs and Switches for EtherCAT

5. Press the Reset push button (1) of the board that the firmware is loaded from the board.
6. Configure the Master.

© Hilscher, 2009-2012

5.3 EtherNet/IP Adapter (Slave)

5.3.1 General Data

Real-Time Ethernet System	EtherNet/IP Adapter (Slave)
Protocol rotary switch (25)	Set protocol rotary switch to position 2.
Address rotary switches (20) and (21)	Set both address rotary switches to F. Then the saved configuration is loaded and DHCP is used for startup.
EDS (Device description file)	HILSCHER NXIO50 EIS 1.1.EDS (of CD)
System Requirements	EtherNet/IP Scanner / Master
	For the start after power on or reset the IP address must be assigned via the DHCP server
Support USB	Current firmware has no USB support
I/O Data	4 Byte Input, (Bit 0, 15, 16, 31 with push button switchable) 4 Byte output (LED)
Communication	1 I/O connection (cyclic), up to 2 'Listen only', up to 2 'Input only'
Acyclic Communication	Get_Attribute_Single Get_Attribute_All Set_Attribute_Single Set_Attribute_All
IP Address	Via DHCP

Table 17: General Data EtherNet/IP Adapter (Slave)

5.3.2 Configuring NXIO 50-RE for EtherNet/IP Adapter (Slave)

1. Verify that a SD/MMC card with the firmware files on it is inserted in slot (11) of the board.
2. The protocol switch (25) of the NXIO 50 board must be set to 2.
3. Connect the power supply to the NXIO 50-RE Board.
4. Connect the boards/devices with Ethernet cables.

Communication System	Hub	Switch
EtherNet/IP	applicable	applicable

Table 18: Use of Hubs and Switches for EtherNet/IP

5. Start the DHCP server
6. Press the Reset push button of the board that the firmware is loaded from the board.
7. Configure the Master.

© Hilscher, 2009-2012

5.4 SERCOS Slave

5.4.1 General Data

Real-Time Ethernet System	sercos Slave
Protocol rotary switch (25)	Set protocol rotary switch to position 4.
Address rotary switches (20) and (21)	Device address from 1 to 127
SDDML (Device description file)	Hilscher NXIO50 RE S3S FSPIO FixCFG.xml (on CD)
System Requirements	sercos Master
Firmware Support USB	Current firmware has no USB support.
I/O Data	4 Byte Input, (Bit 0, 15, 16, 31 with push button switchable) 4 Byte Output (LED) SVC or cyclically configurable.
Functions	Real-Time Data Service Channel Ring or Line Topology Synchronization CON_CLK, DIV_CLK

Table 19: General Data sercos Slave

5.4.2 Configuring NXIO 50-RE for sercos

1. Verify that a SD/MMC card with the firmware files on it is inserted in slot (11) of the board.
2. The protocol switch (25) of the NXIO 50 board must be set to 4.
3. Set the address switch (20) (*16) and the address switch (21) (*1).
4. Connect the power supply to the NXIO 50-RE Board.
5. Connect the boards/devices with Ethernet cables.
6. Connect the devices using Ethernet cable. (Hubs and switches are forbidden).
7. Configure the Master.

© Hilscher, 2009-2012

5.5 Open Modbus/TCP Server

5.5.1 General Data

Real-Time Ethernet System	Open Modbus/ TCP Server
Protocol rotary switch (25)	Set protocol rotary switch to position 6.
Address rotary switches	Not used
EDS (Device description file)	Not necessary
System Requirements	Open Modbus TCP Client: e. g. ModScan32
	IP Address via DHCP
Firmware Support USB	Current firmware has no USB support.
I/O Modbus Server	4 Byte Input, (Bit 0, 15, 16, 31 with push button switchable) 4 Byte Output (LED)
Function Codes	1, 2, 3, 4, 5, 6, 7, 15, 16
	Function Code 1: 1 .....32 (coil read) Function Code 2: 10001 ....10032 (2 register read) Function Code 3: 40001 ....40002 (2 register read) Function Code 4: 30001 ....30002 (2 register read) Function Code 5: 1 .....32 (coil write) Function Code 6: 40001 ....40002 (2 register write) Function Code 15: 1 .....32 (coil write) Function Code 16: 40001 ....40002 (2 register write)
IP Address	via DHCP
Message Modus	Server

Table 20: General Data Open Modbus/TCP Server

5.5.2 Configuring NXIO 50-RE for Open Modbus/TCP Server

1. Verify that a SD/MMC card with the firmware files on it is inserted in slot (11) of the board.
2. The protocol switch (25) of the NXIO 50 board must be set to 6.
3. Connect the power supply to the NXIO 50-RE Board.
4. Connect the boards/devices with Ethernet cables. Add switches or hubs if necessary. If you use only NXIO 50-RE boards for your installation then no switch is necessary.

Communication System	Hub	Switch
Open Modbus/TCP	applicable	applicable

Table 21: Use of Hubs and Switches for Open Modbus/TCP

5. Configure the Client.

© Hilscher, 2009-2012

5.6 POWERLINK Controlled Node (Slave)

5.6.1 General Data

Real-Time Ethernet System	Ethernet POWERLINK Controlled Node (Slave)
Protocol rotary switch (25)	Set protocol rotary switch to position 5.
Address rotary switches (20) and (21)	Node ID of the Ethernet POWERLINK Controlled Node from 01 hex to EF hex (1 … 239 dec). Node ID 1: (20) is 0 and (21) is 1, … Node ID 239: (20) is E and (21) is F.
XDD (Device description file)	00000044_NXIO 50-RE PLS.xdd (on CD)
Parameters set by the firmware	All configuration data as PDO configuration etc.
Support USB	Current firmware has no USB support
I/O Data	4 Byte Input, (Bit 0, 15, 16, 31 with push button switchable) 4 Byte output on LEDs
Functions	Integrated Hub SDO Up-/Download SDO over ASND
Poll Request/ Response	Response Time 1µs
Version	V2

Table 22: General Data POWERLINK Controlled Node (Slave)

5.6.2 Configuring NXIO 50-RE for POWERLINK Controlled Node (Slave)

1. Verify that a SD/MMC card with the firmware files on it is inserted in slot (11) of the board.
2. The protocol switch (25) of the NXIO 50 board must be set to 5.
3. Connect the power supply to the NXIO 50-RE Board.
4. Connect the boards/devices with Ethernet cables. Add hubs if necessary. If you use only NXIO 50-RE boards for your installation then no switch is necessary.

Communication System	Hub	Switch
POWERLINK	applicable	forbidden

Table 23: Use of Hubs and Switches

5. Configure the Master.

© Hilscher, 2009-2012

6 Interfaces

6.1 Ethernet Interface

For the Ethernet interface use RJ45 plugs and twisted pair cable of category 5 (CAT5) or higher, which consists of 4 twisted cores and has a maximum transmission rate of 100 MBit/s (CAT5).

6.1.1 Ethernet pinning at the RJ45 Socket

Note: The device supports the Auto Crossover function. Due to this fact RX and TX can be switched. The following figure shows the RJ45 standard pinning.

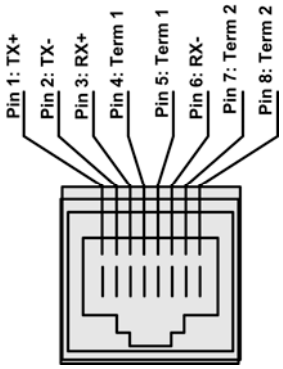


Figure 3: Ethernet pinning at the RJ45 Socket

Pin	Signal	Meaning
1	TX+	Transmit Data +
2	TX–	Transmit Data –
3	RX+	Receive Data +
4	Term 1	Connected to each other and terminated to PE through RC circuit*
5	Term 1	
6	RX–	Receive Data –
7	Term 2	Connected to each other and terminated to PE through RC circuit*
8	Term 2	
		* Bob Smith Termination

Table 24: Ethernet-Pin-Assignment RJ45

6.1.2 Ethernet Connection Data

Medium	2 x 2 Twisted-Pair cupric cable, CAT5 (100 MBit/s)
Length of cable	max. 100 m
Transmission rate	10 MBit/s / 100 MBit/s

Table 25: Ethernet Connection Data

© Hilscher, 2009-2012

6.1.3 Use of Hubs and Switches

For the corresponding communication systems the use of hubs and switches is forbidden or applicable. The following table shows the use of hubs and switches by communication system:

Communication System	Hub	Switch
EtherCAT	forbidden	applicable only between Master and 1. participant
EtherNet/IP	allowed	applicable (10 MBit/s / 100 MBit/s, Full or Half Duplex, Auto-Negotiation)
Open Modbus/TCP	allowed	applicable (10 MBit/s / 100 MBit/s, Full or Half Duplex, Auto-Negotiation)
POWERLINK Controlled Node	allowed	forbidden
PROFINET IO	forbidden	applicable only, if the switch supports 'priority tagging' (100 MBit/s, Full duplex)
sercos	forbidden	forbidden

Table 26: Use of Hubs and Switches

6.2 Mini-B USB- Connector (5- Pin)

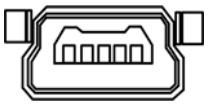


Figure 4: Mini-B USB Connector (5 Pin), X2

Pin	Name	Description
1	USB_EXT	USB Bus Power (+5 V, supplied externally)
2	D-	Data -
3	D+	Data +
4	ID	Not connected
5	GND	Ground

Table 27: Pin assignment X2

This interface is not supported by the current firmware.

© Hilscher, 2009-2012

7 LEDs Real-Time-Ethernet- Systems

7.1 LED Names of the Real-Time Ethernet Systems

Note: Depending from the configured MMC card the NXIO 100-RE Board LEDs are configured to the corresponding real-time Ethernet system.

NXIO 50-LED's		EtherCAT Slave	EtherNet/IP	POWERLINK	Open Modbus/TCP	PROFINET IO	sercos Slave
⑤ SYS (yellow / green)		SYS	SYS	SYS	SYS	SYS	SYS
④ COM 0 (red/ green)		RUN	MS	BS	RUN	SF	S3
② COM 1 (red/ green)		ERR	NS	BE	ERR	BF	-
RJ45 Ch0	green ⑨	L/A IN	LINK	L/A	LINK	LINK	L/A
	yellow ⑧	-	ACT	-	ACT	RX/TX	-
RJ45 Ch1	green ㉘	L/A OUT	LINK	L/A	LINK	LINK	L/A
	yellow ㉙	-	ACT	-	ACT	RX/TX	-

Table 28: LED Names for each Real Time Ethernet System

LED	Name	Meaning
System Status	SYS	System
Communication Status	RUN	Run
	ERR	Error
	S3	sercos Status
	STA	Status
	SF	System Failure
	BF	Bus Failure
	MS	Module Status
	NS	Network Status
	BS	Bus Status
	BE	Bus Error
RJ45	LINK, L	Link
	ACT, A	Activity
	L/A	Link/Activity
	L/A IN	Link/Activity Input
	L/A OUT	Link/Activity Output

Table 29: Meaning LED Names

© Hilscher, 2009-2012

7.2 SYS-LED

This LED indicates important operating states of the board.

LED	Color	State	Meaning
SYS ⑤	green	On	Operating System running.
	yellow	Flashing cyclic with 1Hz	Device indicates boot error.
	yellow	static	Bootloader is waiting for booting procedure.
	-	Off	Power supply for the device is missing or hardware defect.

Table 30: SYS-LED

To determine the position of the LED use the device drawings in section *Device Drawings and Connections* on page 15.

© Hilscher, 2009-2012

7.3 LEDs Real-Time Ethernet Protocols

7.3.1 LED EtherCAT-Slave

The subsequent table describes the meaning of the LEDs for the Real-Time Ethernet device when the firmware of the EtherCAT Slave protocol is loaded in the board.

LED	Color	State	Meaning
RUN Number in the device drawing: **COM0** ④	**Duo LED red/green**		
	(off)	Off	**INIT**: The device is in state INIT
	(green)	Blinking	**PRE-OPERATIONAL**: The device is in state PRE-OPERATIONAL
	(green)	Single Flash	**SAFE-OPERATIONAL**: The device is in state SAFE-OPERATIONAL
	(green)	On	**OPERATIONAL**: The device is in state OPERATIONAL
ERR Number in the device drawing: **COM1** ②	**Duo LED red/green**		
	(off)	Off	**No error**: The EtherCAT communication of the device is in working condition
	(red)	Blinking	**Invalid Configuration**: General Configuration Error (Example: State change commanded by master is impossible due to register or object settings.)
	(red)	Single Flash	**Unsolicited State Change**: Slave device application has changed the EtherCAT state autonomously: Parameter "Change" in the AL status register is set to 0x01:change/error (Example: Synchronization Error, device enters Safe-Operational automatically.)
	(red)	Double Flash	**Application Watchdog Timeout**: An application watchdog timeout has occurred. (Example: Sync Manager Watchdog timeout)
	(red)	On	**PDI Watchdog Timeout**: A PDI Watchdog timeout has occurred (Example: Application controller is not responding any more)
L/A IN RJ45 Ch0 ⑨ **L/A OUT** RJ45 Ch1 ㉘	**LED green**		
	(green)	On	A link is established
	(green)	Flashing	The device sends/receives Ethernet frames
	(off)	Off	No link established
RJ45 Ch0 ⑧ RJ45 Ch1 ㉙	**LED yellow**		
	-	-	This LED is not used.

Table 31: LEDs EtherCAT Slave

© Hilscher, 2009-2012

LED State Definition for EtherCAT Slave for the LEDs RUN ④ and ERR LED ②

Indicator state	Definition
On	The indicator is constantly on.
Off	The indicator is constantly off.
Blinking	The indicator turns on and off with a frequency of 2,5 Hz: on for 200 ms, followed by off for 200 ms.
Single Flash	The indicator shows one short flash (200 ms) followed by a long off phase (1,000 ms).
Double Flash	The indicator shows a sequence of two short flashes (each 200 ms), separated by a short off phase (200 ms). The sequence is finished by a long off phase (1,000 ms).

Table 32: LED State Definition for EtherCAT Slave for the RUN and ERR LEDs

To determine the position of the LEDs use the device drawings in section *Device Drawings and Connections* on page 15.

© Hilscher, 2009-2012

7.3.2 LED EtherNet/IP-Adapter (Slave)

The subsequent table describes the meaning of the LEDs for the Real-Time Ethernet device when the firmware of the EtherNet/IP Adapter (Slave) protocol is loaded in the board.

LED	Color	State	Meaning
MS Number in the device drawing: **COM0** 4	**Duo LED red/green**		
	(green)	On	**Device operational**: If the device is operating correctly, the module status indicator shall be steady green.
	(green)	Flashing	**Standby**: If the device has not been configured, the module status indicator shall be flashing green.
	(red)	On	**Major fault**: If the device has detected a non-recoverable major fault, the module status indicator shall be steady red.
	(red)	Flashing	**Minor fault**: If the device has detected a recoverable minor fault, the module status indicator shall be flashing red. NOTE: An incorrect or inconsistent configuration would be considered a minor fault.
	(red/green)	Flashing	**Self-test**: While the device is performing its power up testing, the module status indicator shall be flashing green/red.
	(off)	Off	**No power**: If no power is supplied to the device, the module status indicator shall be steady off.
NS Number in the device drawing: **COM1** 2	**Duo LED red/green**		
	(green)	On	**Connected**: If the device has at least one established connection (even to the Message Router), the network status indicator shall be steady green.
	(green)	Flashing	**No connections**: If the device has no established connections, but has obtained an IP address, the network status indicator shall be flashing green.
	(red)	On	**Duplicate IP**: If the device has detected that its IP address is already in use, the network status indicator shall be steady red.
	(red)	Flashing	**Connection timeout**: If one or more of the connections in which this device is the target has timed out, the network status indicator shall be flashing red. This shall be left only if all timed out connections are reestablished or if the device is reset.
	(red/green)	Flashing	**Self-test**: While the device is performing its power up testing, the network status indicator shall be flashing green/red.
	(off)	Off	**Not powered, no IP address**: If the device does not have an IP address (or is powered off), the network status indicator shall be steady off.
LINK/RJ45 Ch0 & Ch1 9 & 28	**LED green**		
	(green)	On	A connection to the Ethernet exists
	(off)	Off	The device has no connection to the Ethernet
ACT/RJ45 Ch0 & Ch1 8 & 29	**LED yellow**		
	(yellow)	Flashing	The device sends/receives Ethernet frames

Table 33: LEDs EtherNet/IP Adapter (Slave)

To determine the position of the LEDs use the device drawings in section *Device Drawings and Connections* on page 15.

© Hilscher, 2009-2012

7.3.3 LED Open Modbus/TCP

The subsequent table describes the meaning of the LEDs for the Real-Time Ethernet device when the firmware of the Open Modbus/TCP protocol is loaded in the board.

LED	Color	State	Meaning
RUN Number in the device drawing: **COM0** ④	**Duo LED red/green**		
	(off)	Off	**Not Ready** OMB task is not ready
	(green)	Flashing cyclic with 1Hz	**Ready, not configured yet** OMB task is ready and not configured yet
	(green)	Flashing cyclic with 5Hz	**Waiting for Communication:** OMB task is configured
	(green)	On	**Connected:** OMB task has communication – at least one TCP connection is established
ERR Number in the device drawing: **COM1** ②	**Duo LED red/green**		
	(off)	Off	No communication error
	(red)	Flashing cyclic with 2Hz (On/Off Ratio = 25 %)	System error
	(red)	On	Communication error active
LINK/RJ45 Ch0 & Ch1 ⑨ & ㉘	**LED green**		
	(green)	On	A connection to the Ethernet exists
	(off)	Off	The device has no connection to the Ethernet
ACT/RJ45 Ch0 & Ch1 ⑧ & ㉙	**LED yellow**		
	(yellow)	Flashing	The device sends/receives Ethernet frames

Table 34: LEDs Open Modbus/TCP

To determine the position of the LEDs use the device drawings in section *Device Drawings and Connections* on page 15.

© Hilscher, 2009-2012

7.3.4 LED POWERLINK Controlled Node / Slave

The subsequent table describes the meaning of the LEDs for the Real-Time Ethernet device when the firmware of the Powerlink Controlled Node/Slave protocol is loaded to the device.

LED	Color	State	Meaning
BS Number in the device drawing: **COM0** (4)	**Duo LED red/green**		
	(off)	Off	Slave initializing
	(green)	Flickering	Slave is in Basic Ethernet state
		Single Flash	Slave is in Pre-Operational 1
		Double Flash	Slave is in Pre-Operational 2
		Triple Flash	Slave is in ReadyToOperate
		On	Slave is Operational
		Blinking	Slave is Stopped
BE Number in the device drawing: **COM1** (2)	**Duo LED red/green**		
	(off)	Off	Slave has no error
	(red)	On	Slave has detected an error
L/A/RJ45 Ch0 & Ch1 (9) & (28)	**LED green**		
	(green)	On	**Link**: A connection to the Ethernet exists
	(green)	Flashing	**Activity**: The device sends/receives Ethernet frames
	(off)	Off	The device has no connection to the Ethernet
RJ45 Ch0 & Ch1 (8) & (29)	**LED yellow**		
	-	-	This LED is not used.

Table 35: LEDs Powerlink Controlled Node/Slave

© Hilscher, 2009-2012

LED State Definition for Powerlink Controlled Node/Slave for the BS/BE LEDs

Indicator state	Definition
On	The indicator is constantly on.
Off	The indicator is constantly off.
Blinking	The indicator turns on and off with a frequency of approximately 2,5 Hz: on for approximately 200 ms, followed by off for 200 ms. Red and green LEDs shall be on alternately.
Flickering	The indicator turns on and off with a frequency of approximately 10 Hz: on for approximately 50 ms, followed by off for 50 ms. Red and green LEDs shall be on alternately.
Single Flash	The indicator shows one short flash (approximately 200 ms) followed by a long off phase (approximately 1,000 ms).
Double Flash	The indicator shows a sequence of two short flashes (each approximately 200 ms), separated by a short off phase (approximately 200 ms). The sequence is finished by a long off phase (approximately 1,000 ms).
Triple Flash	The indicator shows a sequence of three short flashes (each approximately 200 ms), separated by a short off phase (approximately 200 ms). The sequence is finished by a long off phase (approximately 1,000 ms).

Table 36: LED State Definition for Powerlink Controlled Node/Slave for the BS/BE LEDs

To determine the position of the LEDs use the device drawings in section *Device Drawings and Connections* on page 15.

© Hilscher, 2009-2012

7.3.5 LED PROFINET IO-RT-Device

The subsequent table describes the meaning of the LEDs for the Real-Time Ethernet device when the firmware of the PROFINET IO-RT-Device protocol is loaded in the board.

LED	Color	State	Meaning
SF Number in the device drawing: **COM0** ④	**Duo LED red/green**		
	(red)	On	Watchdog timeout; channel, generic or extended diagnosis present; system error
	(red)	Flashing cyclic at 2 Hz (for 3 sec.)	DCP signal service is initiated via the bus
	(off)	Off	No error
BF Number in the device drawing: **COM1** ②	**Duo LED red/green**		
	(red)	On	No configuration; or low speed physical link; or no physical link
	(red)	Flashing cyclic at 2 Hz	No data exchange
	(off)	Off	No error
LINK/RJ45 Ch0 & Ch1 ⑨ & ㉘	**LED green**		
	(green)	On	A connection to the Ethernet exists
	(off)	Off	The device has no connection to the Ethernet
RX/TX/RJ45 Ch0 & Ch1 ⑧ & ㉙	**LED yellow**		
	(yellow)	Flashing	The device sends/receives Ethernet frames

Table 37: LEDs PROFINET IO-RT-Device

To determine the position of the LEDs use the device drawings in section *Device Drawings and Connections* on page 15.

© Hilscher, 2009-2012

7.3.6 LED sercos Slave

The subsequent table describes the meaning of the LEDs for the Real-Time Ethernet device when the firmware of the sercos Slave protocol is loaded in the board.

LED	Color	State	Meaning
S3 (STA) Name in the device drawing: **COM 0** ④	**Duo LED red/green/orange** (orange = red/green simultaneously)		
	(green)	On	**CP4:** Communication phase 4, Normal operation, no error
	(green)	Flashing (4 Hz)	**Loopback**: The network state has changed from „fast-forward“ to „loopback“.
	(red/ green)	Flashing (4 Hz), *The LED flashes at least for 2 seconds from red to green.*	**Communication Error**: Depends on IDN S-0-1003 (for details refer to `sercos Slave Protocol API.pdf`). Shows how long the Master may in the communication phases CP3 and CP4 not received Master SYNC telegrams.
	(red)	On	**SIII C1D**: Error detected according to sercos third generation Cass 1 Diagnosis.
	(orange)	On	**CP0 … CP3**: Communication phase 0 to Communication phase 3
	(orange)	Flashing (4 Hz)	**Identification**: Bit 15 in the Slave device control that indicates remote address allocation or configuration errors between Master and Slaves (for details refer to `sercos Slave Protocol API.pdf` on the product CD oder DVD).
	(off)	Off	No sercos Communication
Name in the device drawing: **COM 1** ②	**Duo LED red/green**		
	-	-	This LED is not used.
L/A/RJ45 Ch0 & Ch1 ⑮ & ⑰	**LED green**		
	(green)	On	Link: A connection to the Ethernet exists
	(green)	Flashing	Activity: The device sends/receives Ethernet frames
	(off)	Off	The device has no connection to the Ethernet
RJ45 Ch0 & Ch1 ⑯ & ⑱	**LED yellow**		
	-	-	This LED is not used.

Table 38: LEDs sercos Slave

© Hilscher, 2009-2012

LED State Definition for sercos Slave for the S3 LED (STA LED) ④

Indicator state	Definition
On	The indicator is constantly on.
Off	The indicator is constantly off.
Flashing (4 Hz)	The indicator turns on and off with a frequency of 4 Hz: on for appr. 125 ms, followed by off for appr. 125 ms.

Table 39: LED State Definition for sercos Slave for the S3 LED (STA LED)

To determine the position of the LEDs use the device drawings in section *Device Drawings and Connections* on page 15.

© Hilscher, 2009-2012

8 Technical Data

Item	NXIO 50-RE, NXIO 50-RE\CR , NXIO 50-RE\CL, NXIO 50-RE\CN
Function	Real-Time-Ethernet
Communication	Determined by the loaded firmware
Protocols	EtherCAT Slave, EtherNet/IP Adapter (Slave), Open Modbus/TCP Server, Ethernet POWERLINK Controlled Node (Slave), PROFINET IO-Device, sercos Slave,
Ethernet Frame Types	Ethernet II
Processor	netX 50
Transmission Rate	10/100 MBit/s, Auto-Negotiation, Cross-Over, Halfduplex/Fullduplex (100 MBit/s)
Inputs	4x pushbutton as Digital Input (Bit 0, 15, 16, 31) 1* Digital (Bit 2)
Outputs	32x LED as Digital Output 1 * Digital (Bit 0) 1 * Digital, 3,3V, 25Hz, triangle-square-pulse 2 * Digital (Protocol sercos / EtherCAT)
Displays	SYS, 2x COM, 4 * Ethernet
Control Elements	3x Rotary Switches 0-F
Measuring Points	2x Synchronisation signal 0-15
Memory Interface	MMC
Diagnostic Interface	USB Device, Mini-B plug
Communication Interface	2x Ethernet 100 Base-TX, RJ45 potential free
Supply voltage	+12 to +30 V DC
Power Consumption	2,6 W
Operating Temperature	0 °C ... 50 °C
Dimensions (L x B x H)	100 x 65 x 16 mm

Table 40: Technical data NXIO 50-RE Board

Item	NXIO 50-RE\CA
Function	Connection-Board Real-Time-Ethernet for other NXIO 50-RE Boards without RJ45 sockets
Transmission Rate e	10/100 MBit/s
Communication Interface	2x Ethernet 100 Base-TX, RJ45
Operating voltage	Will be conducted
Power Consumption	0 W
Operating Temperature	0 °C ... 50 °C
Dimensions (L x B x H)	100 x 32,5 x 16 mm

Table 41: Technical data NXIO 50-RE \CA Board

© Hilscher, 2009-2012

9 Glossary

netX

networX on chip, next generation of communication controllers

PIO

Programmable **I**nput / **O**utput

© Hilscher, 2009-2012

10 Contacts

Headquarters

Germany
Hilscher Gesellschaft für
Systemautomation mbH
Rheinstrasse 15
65795 Hattersheim
Phone: +49 (0) 6190 9907-0
Fax: +49 (0) 6190 9907-50
E-Mail: info@hilscher.com

Support
Phone: +49 (0) 6190 9907-99
E-Mail: de.support@hilscher.com

Subsidiaries

China
Hilscher Systemautomation (Shanghai) Co. Ltd.
200010 Shanghai
Phone: +86 (0) 21-6355-5161
E-Mail: info@hilscher.cn

Support
Phone: +86 (0) 21-6355-5161
E-Mail: cn.support@hilscher.com

France
Hilscher France S.a.r.l.
69500 Bron
Phone: +33 (0) 4 72 37 98 40
E-Mail: info@hilscher.fr

Support
Phone: +33 (0) 4 72 37 98 40
E-Mail: fr.support@hilscher.com

India
Hilscher India Pvt. Ltd.
New Delhi - 110 065
Phone: +91 11 43055431
E-Mail: info@hilscher.in

Italy
Hilscher Italia S.r.l.
20090 Vimodrone (MI)
Phone: +39 02 25007068
E-Mail: info@hilscher.it

Support
Phone: +39 02 25007068
E-Mail: it.support@hilscher.com

Japan
Hilscher Japan KK
Tokyo, 160-0022
Phone: +81 (0) 3-5362-0521
E-Mail: info@hilscher.jp

Support
Phone: +81 (0) 3-5362-0521
E-Mail: jp.support@hilscher.com

Korea
Hilscher Korea Inc.
Suwon, Gyeonggi, 443-734
Phone: +82 (0) 31-695-5515
E-Mail: info@hilscher.kr

Switzerland
Hilscher Swiss GmbH
4500 Solothurn
Phone: +41 (0) 32 623 6633
E-Mail: info@hilscher.ch

Support
Phone: +49 (0) 6190 9907-99
E-Mail: ch.support@hilscher.com

USA
Hilscher North America, Inc.
Lisle, IL 60532
Phone: +1 630-505-5301
E-Mail: info@hilscher.us

Support
Phone: +1 630-505-5301
E-Mail: us.support@hilscher.com

© Hilscher, 2009-2012